

Appl. No.: 10/797,938  
Amdt. dated 12/21/2007  
Reply to Office Action of 06/22/2007

### **REMARKS/ARGUMENTS**

In view of the following remarks reconsideration of the pending claims is respectfully requested.

Claims 1 – 48 have been rejected under 35 U.S.C. § 103(a) as being obvious over Heikkila in combination with U.S. Patent No. 3,988,198 to Wilson et al. Applicants respectfully traverse this rejection.

The primary reference, Heikkila, is directed to a process for the preparation of xylose from a paper-grade hardwood pulp which includes treating the pulp with a xylanase enzyme treatment. See Abstract. Heikkila repeatedly emphasizes that the process is directed to extraction of xylose from paper-grade pulp. See for example, Abstract; Column 1, line 8 – 12; column 5, lines 14 – 16; Examples 1 – 21 and the Claims. In particular, Heikkila teaches the desirability of using an enzyme to recover xylose from a paper grade pulp. After xylanase treatment and removal of the xylan, the resulting pulp could then be used as a dissolving pulp. See column 5, lines 43 – 49. Thus, one of the end products of Heikkila's process is a dissolving grade pulp.

Wilson is directed to a process for recovering and reutilizing pulping chemicals from waste effluents produced during the manufacture of dissolving grade pulps. See column 1, lines 9 – 12. Wilson has absolutely no relation to a process for the production of xylose. Wilson teaches that heat treatment of spent effluent renders the “effluents suitable for use in cooking, bleaching, and refining of dissolving pulps without adverse effect on the quality of the pulps.” See column 2, lines 23 – 28. According to the teachings of Wilson, heat treatment of the spent effluent stream causes thermal degradation of the hemicelluloses that are dissolved in the spent effluent “so that hemicelluloses will no longer precipitate out on cellulosic materials or otherwise interfere with the action of the caustic soda when the effluents are utilized for treating cellulosic material.” See column 2, lines 66 – column 3, line 1. As a result, the spent effluent streams can be reused in further processes and in particular in caustic extractions.

To establish a *prima facie* case of obviousness, three basic criteria must be met: 1) the prior art reference (or references when combined) must teach or suggest all the claim elements; 2) the combination of references must provide a predictable result; and 3) there must be a

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reasonable expectation of success. Further, the Office has to provide an explicit basis for combining the references.

As a preliminary matter, the Office Action asserts that the claims do not distinguish between a paper grade pulp and a dissolving grade pulp. It is clear from this statement that the Office's understanding of dissolving grade pulp, and in particular, prehydrolyzed pulp is incorrect. As noted in Applicants' previous response, a prehydrolyzed pulp is a dissolving grade pulp. The accompanying Declaration under 37 C.F.R. 1.132 by inventor Dr. Li establishes that a pre-hydrolyzed pulp is a dissolving grade pulp. Dr. Li is a recognized expert in the field of paper and pulp production having published more than 30 articles relating to pulp technologies. Paragraph 4 of Dr. Li's Declaration states that in "the art of pulp technology and related processes, it is commonly understood and recognized that a pre-hydrolyzed pulp is a dissolving grade pulp." Further, Applicants have previously provided evidence that establishes that a prehydrolyzed pulp is a dissolving grade pulp. See for example, Gary A. Smook, HANDBOOK FOR PULP & PAPER TECHNOLOGIST, 2d, page 79 (1999). Thus, one or ordinary skill in the art would understand and recognize that a prehydrolyzed pulp is a dissolving grade pulp.

In KSR International Co. v. Teleflex Inc, 127 S. Ct. 1727, 1739 (U.S. 2007), the Supreme Court held that in determining obviousness, one must look to whether the combination of the elements provides a predictable result. In the present case, one of ordinary skill in the art would not be motivated to use the dissolving grade pulp of Wilson in the process of Heikkila for several reasons. In particular, Wilson and Heikkila cannot be combined in a predictable way to arrive at the claimed invention. In fact, the proposed combination is contrary to the teachings of the references.

First, Heikkila and Wilson are directed to two very different and distinct purposes. As such, there can be no basis for asserting that the result of using Wilson's pulp in the process of Heikkila would provide a predictable result, let alone provide the claimed invention. As noted above, Heikkila is directed to the production of xylose from a paper grade pulp using an enzymatic treatment. Wilson on the other hand, is directed to a process of reusing a spent hemicaustic effluent stream in a cooking process. As such, these patents and their respective teachings are completely unrelated to each other. In paragraphs 8 - 9, Dr. Li provides several

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reasons why one of ordinary skill in the art would not be motivated to use the pre-hydrolyzed pulp of Wilson in the process of Heikkila. As noted in Dr. Li's Declaration, the process and objective of Heikkila is quite different from the problem addressed by Wilson, namely the recovery of spent chemicals from caustic waste effluent, whereas Heikkila is directed to using a xylanase treatment to recover xylose from a paper grade pulp. These two processes are completely different from each other and they include no teachings that would lead one of ordinary skill to combine them as contemplated by the Examiner. There is no basis for asserting that these disparate teachings can be combined to provide a predictable result. That is, one of ordinary skill in the art would not predict that the combination of Wilson and Heikkila would produce the claimed invention. A person of ordinary skill in the art would not look to the teachings of Wilson for a pulp to be used in the xylanase enzyme treatment process of Heikkila.

Additionally, Heikkila's process repeatedly emphasizes the benefits and advantages of using a paper grade pulp. In fact, Heikkila specifically teaches that it is the enzymatic treatments of paper grade pulp that results in the significant recovery of xylose. In contrast to Heikkila, Wilson's pulp is a prehydrolyzed (i.e., dissolving grade pulp). Paper grade pulp and dissolving grade pulps are significantly different from each other and have different chemical structures, properties, and end uses. In view of these significant differences, there is no basis for asserting that it would be obvious to substitute the dissolving grade pulp of Wilson for the paper grade pulp of Heikkila because the outcome would be uncertain at best. Accordingly, it cannot be predicted that the use of a prehydrolyzed pulp, such as that described in Wilson, in the process of Heikkila would arrive at the claimed invention. For this additional reason, the claimed invention is patentable over the cited references.

Further, it is clear that the Examiner is attempting to combine the references based solely on the fact that the Wilson patent discusses a prehydrolyzed pulp. There are no teachings in either of the references that would lead one of ordinary skill in the art to substitute the paper grade pulp of Heikkila with the prehydrolyzed pulp of Wilson, or that the result of such combination would result in a predictable outcome. In fact, Heikkila includes numerous statements that teach away from the use of dissolving-grade pulps, such as prehydrolyzed pulp, as a source of xylan/xylose. For example, Heikkila states at column 3, lines 3 – 7 that [t]he

additional purification, which involves treatment with alkali to remove and destroy hemicelluloses and bleaching to remove and destroy lignin reduces the yield and increases the cost of "dissolving-grade" cellulose derived from wood pulp", and at column 3, lines 3 – 7, Heikkila describes that the processes used in preparing dissolving-grade pulps would result in decreased yields of pulp. Heikkila further states "[t]he low molecular weight of some of the hemicellulose fragments makes them hard to isolate, while in some cases (prehydrolysis kraft), the harsh conditions convert the hemicelluloses to decomposition products." See column 2, lines 41 – 44 (emphasis added). From these excerpts it can be clearly seen that Heikkila includes numerous statements that lead away from using a dissolving-grade pulp (i.e., a prehydrolyzed pulp) because the processes involved in the prehydrolysis process results in decomposition of the hemicellulose components, such as xylan. Based on these excerpts, it can clearly evident that the proposed modification would not provide a predictable result. Thus, one of ordinary skill in the art would not be motivated to use a prehydrolyzed pulp in the process of Heikkila, let alone in a process for producing a xylose.

One of the preferred objectives of Heikkila is the simultaneous recovery of xylose along with the production of a dissolving grade pulp. For example, Heikkila states "[i]n a preferred embodiment, the process of the present invention further comprises [the] simultaneous production of dissolving-grade pulp of very high quality and high yields of xylose." See column 5, lines 43 – 49. Thus, one of the objectives of Heikkila's process is the simultaneous production of both xylose and a dissolving grade pulp. However, as noted above, a prehydrolyzed pulp is a dissolving grade pulp. As such, one of ordinary skill in the art would not select the use of a dissolving grade pulp (i.e., the prehydrolyzed pulp of Wilson) as a starting product in the process of Heikkila. As discussed in paragraph 8 of Dr. Li's Declaration, one of ordinary skill in the art would not use the prehydrolyzed pulp of Wilson in Heikkila's process because it would serve no purpose to modify the Heikkila process to include a desired end product as a starting product. Accordingly, one of skill in the art would not be motivated to modify the process of Heikkila to substitute a paper grade pulp with the prehydrolyzed pulp of Wilson.

Moreover, using the prehydrolyzed pulp of Wilson in the process of Heikkila would result in the pulp being unsatisfactory for its intended purpose. This is a clear indication that

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their exists a lack of predictability in arriving at the claimed invention based on the combination of Heikkila and Wilson. In paragraph 9 of the Declaration, Dr. Li states that substituting a dissolving grade pulp (e.g., Wilson's prehydrolyzed pulp) for a paper grade pulp in the process of Heikkila would result in significant loss of pulp viscosity, which would render the resulting pulp unusable. In particular, Dr. Li's Declaration establishes that if a prehydrolyzed kraft pulp, such as the one described in Wilson, is treated in accordance with Heikkila's process, the resulting pulp would have an IV that would be too low to be used as a dissolving grade pulp. As such, the proposed modification would prevent one of the primary objectives of Heikkila and would make the resulting pulp unsatisfactory for its intended purpose. Accordingly, one of ordinary skill in the art would avoid using Wilson's prehydrolyzed pulp in the process of Heikkila.

Finally, the Examiner has provided no reasonable basis which would motivate one of ordinary skill in the art to make the proposed modification. The Examiner has attempted to gloss over this lack of motivation by stating that Wilson is only cited to show that procedures that involve the use of prehydrolyzed cellulose pulp are known in the art. However, the Supreme Court in *KSR* stated that in making an obviousness rejection, the Office must provide an explicit basis for making the combination. The Office has failed to do this. The fact that procedures involving a prehydrolyzed pulp may be known is not sufficient basis to provide motivation to use the pulp of Wilson in the process of Heikkila. This is particularly true given the numerous reasons set forth by Dr. Li why one of ordinary skill in the art would be motivated to not make such a modification.

The Examiner has also referenced an excerpt from Wilson that states ““that heat treatment of hemicaustic effluent allows gradual lowering of the extraction concentration from 9.5% NaOH to 9.1% NaOH, without adverse effect on caustic solubility and hemicellulose content of the extracted pulp and with only minor reduction of brightness.”” See Office Action dated January 12, 2007 (quoting Wilson column 9, lines 11 – 16). This excerpt is discussing the merits of heat treating the spent effluent, such as lowering of NaOH concentration in the treated spent effluent in comparison to non-treated spent effluent; it is not discussing the merits of dissolving-grade pulp or pulp that is extracted using the spent heat treated effluent. At best it

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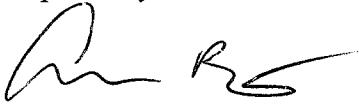
states that the pulp extracted with the heat treated effluent did not adversely affect the hemicellulose content of the extracted pulp. It is not clear how this statement provides a basis for using a dissolving-grade pulp in the process of Heikkila since neither the claimed invention nor Heikkila discuss heat treatment of a spent effluent stream, let alone, using the heat treated spent effluent stream in the process. The treatment of a spent effluent stream has absolutely no applicability to the process described in Heikkila and does not provide any basis for substituting the pulp of Wilson in a completely different and unrelated process.

In view of the foregoing remarks it is respectfully submitted that the rejections under 35 U.S.C. § 103 have been overcome, and that the pending claims are in condition for immediate allowance.

### *Conclusion*

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



Timothy J. Balts  
Registration No. 51,429

**Customer No. 00826**  
**ALSTON & BIRD LLP**  
Bank of America Plaza  
101 South Tryon Street, Suite 4000  
Charlotte, NC 28280-4000  
Tel Charlotte Office (704) 444-1000  
Fax Charlotte Office (704) 444-1111  
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